

**SECOND LOG PRUNING TRIALS  
— INSTALLATION REPORT**

**M. Dean**

**REPORT NO. 22    NOVEMBER 1995**

**FOREST & FARM PLANTATION MANAGEMENT  
COOPERATIVE**

**EXECUTIVE SUMMARY**

**SECOND LOG PRUNING TRIALS  
— INSTALLATION REPORT**

**M. Dean**

**Report No. 22**

**November 1995**

Four second log pruning trials have been installed to monitor the effect on tree growth and log quality of pruning radiata pine above 6.0m. A three dimensional response surface trial design has been used incorporating 25 plots at each site.

The trials are located at the following sites;

<b>Forest</b>	<b>Location</b>	<b>Forest Owner</b>	<b>Expt No</b>	<b>Site Index</b>	<b>Date Installed</b>
Ngaumu	Wairarapa	Juken Nissho	FR 201	30	Nov 1993
Aupouri **	Northland	Juken Nissho	FR 241	22	Dec 1994
Waiotahi	Eastern BOP.	Tasman	FR 243	36	April 1995
Otago Coast	Otago	Wenita	FR 247	27	May 1995

\*\* This trial is currently not funded by the Forest & Farm Plantation Management Cooperative.

All of the trials are installed in existing first rotation stands. With the exception of the Aupouri site, which is on recently stabilised sand dunes, the sites have a history of some farming activity. Basal area levels range from low at Aupouri, medium at Ngaumu and Otago Coast to high at Waiotahi.

Details of each site including trial location and plot layout maps are documented.

Second Log pruning in action Ngaumu - Feb 1995



## SECOND LOG PRUNING TRIALS

### Background:

A positive market outlook for clearwood and high prices being consistently received for pruned logs have resulted in an increased interest from forest managers growing a greater volume of pruned wood. The traditional pruned height of approximately 6m is being questioned and final stockings revised. In the past two or three years some forest companies have already moved away from the accepted industry standard by pruning to 8 - 8.5m. This change in strategy has been largely to achieve multiples of peeler bolt lengths rather than sawlogs. Regime evaluations using STANDPAK have shown that under many scenarios second log pruning to be a profitable management option.

Little is known of the effect on tree growth (and the resulting DOS size) of pruning the second log (ie. above 6 metres). Tree growth is currently predicted using the EARLY growth model. However the lack of data from plots (as few as six exist at stockings in the 200-300 stems / ha range) pruned above 6 metres has meant that these predictions have never been adequately validated. A work plan (No 2206) has been developed (Appendix 1) and a series of trials installed to provide the data needed to give confidence that model predictions are accurate for the important trade off between pruning above 6 metres and tree growth. The data derived from these trials will initially be used to validate the existing growth models and will likely be used in the derivation of new functions in future upgrades of EARLY or other appropriate growth models.

### TRIAL DESIGN:

The data from this trial series will be used for validating and / or constructing models. Therefore a trial design suited to regression analysis techniques has been chosen in preference to designs allowing for comparison between treatments by analysis of variance. The trial design has also been chosen to limit the number of plots involved in order that it can be easily repeated on a range of sites.

The trial design involves a three factor fully rotatable response surface design as given in Table 1. To increase the robustness of the trial design three treatments at the 150 and 200 stems/ha stockings have been replicated twice.

Plots were blocked on height and or basal area prior to treatments being allocated.

**Table 1 summary of treatment levels.**

Variable	step	-1.68	-1	0	1	1.68
Pruned height	3.0m	4.0	5.8	8.8	11.8	13.6
Crown length	1.5m	3.9	4.9	6.4	7.9	8.9
Final stocking	75 stems/ha	150	200	275	350	400

## TREATMENTS:

Treatments involve variations of the variables determining crown/ha ie crown length, stems/ha, and pruned height. In addition to the pruning treatments an unpruned control will be included at 200 and 350 stems / ha final stocking. Table 2 gives the combinations of variables and number of plots.

**Table 2. Numbers of plots as indicated by pruned height**

			Final	stocking		
		150	200	275	350	400
	3.9			8.8*		
Crown	4.9		5.8, 11.8 x two		5.8,11.8	
length (m)	6.4	8.8 x two		4.0, 8.8 x six, 13.6		8.8
	7.9		5.8 , 11.8 x two		5.8,11.8	
	8.9			8.8		
	unpruned		0.0		0.0	

\* pruned height (m)

unless specified otherwise all treatments have 1 replication per site.

Total number of plots = 25

Treatments will be allocated randomly to each block.

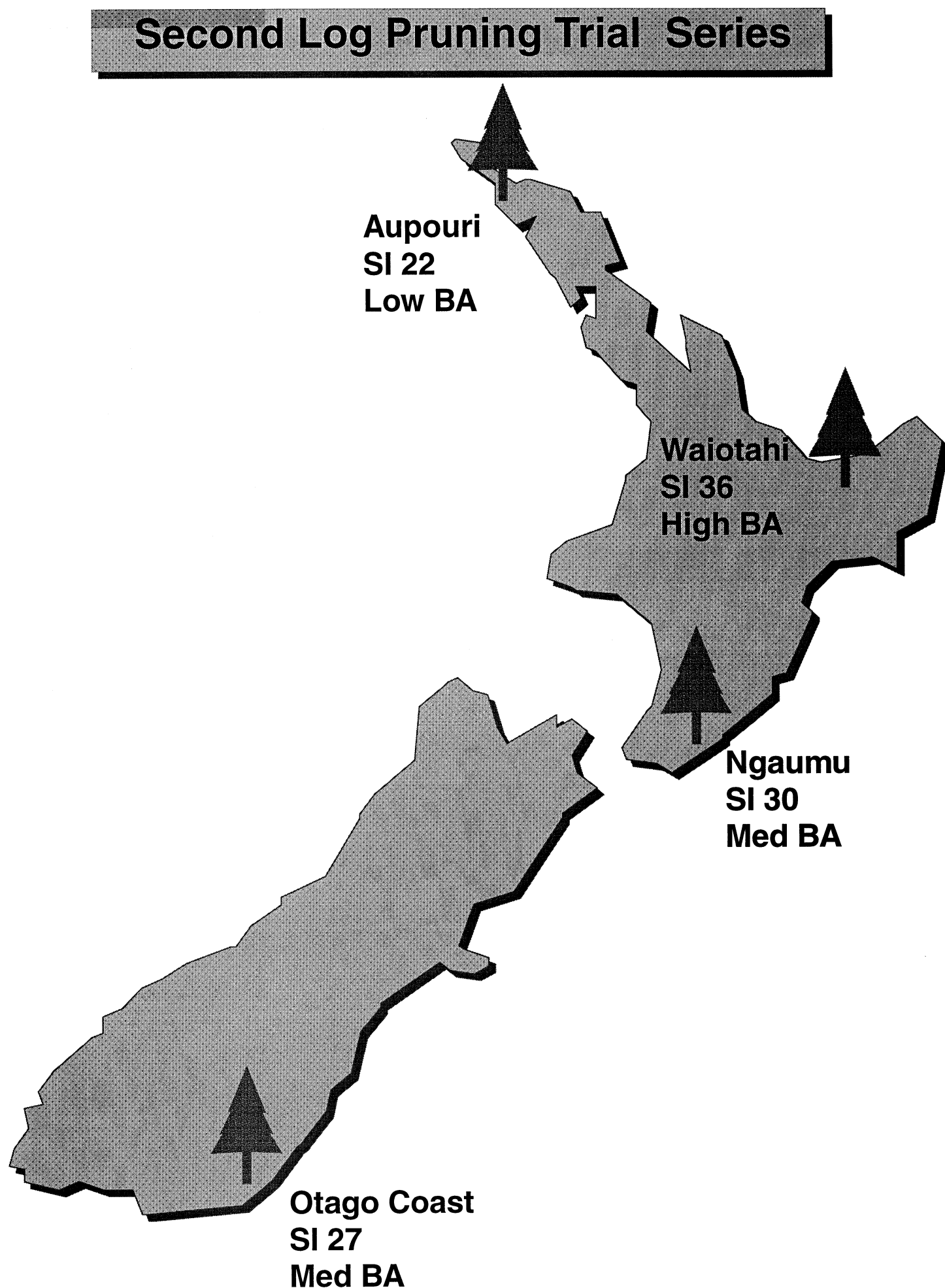
## TRIAL LOCATIONS:

The trials are located on a range of sites. These are chosen to cover a range of site indices and basal area levels. The location and relative growth performance of each trial is shown in Table 3 and Figure 1.

**Table 3: Trial location and growth level.**

Forest	Location	Forest Owner	Expt No	Date Installed	Site Index	Basal area level
Ngaumu	Wairarapa	Juken Nissho	FR 201	Nov 1993	30	Medium
Aupouri	Northland	Juken Nissho	FR 241	Dec 1994	22	Low
Waiotahi	Eastern BOP.	Tasman	FR 243	April 1995	36	High
Otago Coast	Otago	Wenita	FR 247	May 1995	27	Medium

Figure 1 Trial location map.



## **Plot layout**

The trials were installed into stands with a stocking of at least 400 acceptable stems / ha. Trial installation was timed to be immediately prior to the high pruning being carried out (ie.<11.0 m MTH). Each trial occupies 7.8 hectares.

There are 25 plots at each site. Each treatment plot consists of a 0.309 ha square (55.6 m \* 55.6 m ) plot within which a 0.1000 ha circular plot contains the trees to be measured. The plot radius for the circular plot is 17.8 metres plus slope correction where required. This plot layout allows for a minimum buffer of 10 metres.

All trees have a numbered tag attached 5 cm above the DBH measurement point.

Details of each site follow.

## FR 201 NGAUMU - ESTABLISHMENT DATA

**Trial No.:** FR 201

**Contact Person:** Stu Orme  
ph (06) 377 4944

**Forest Owner:** Juken Nissho Ltd  
P.O. Box 535,  
MASTERTON

**Forest and Compartment:** Ngaumu Cpt 626

**Treatment of surrounding Compartment:**

*P. radiata* pruned to 9 metres,  
approx 300 stems/ha

**Year stand planted:** 1985

**Stocking at installation:** 1100

**MTH at installation:** 12.7 metres

**GF Rating:** 14

**Latitude/Longitude:** S. Lat. 40° 50'

**E. Long.** 176° 10'

**Altitude:** 260 metres

**Geology:** Thick sequences of siliceous tuffs with extensive flint beds and white limestone

**Soil Type:** Light yellowish grey silt loam on weathered argillite.

**Climate:** Rainfall 1200 mm p.a., cool winters, hot dry summers, very windy.

**Weeds:** Low to moderate infestation of; bracken, gorse, and shrub hardwoods.

**Slope and aspect:** 20° S.E.

**Date trial installed:** December 1993

**Previous land use:** Reverted pasture

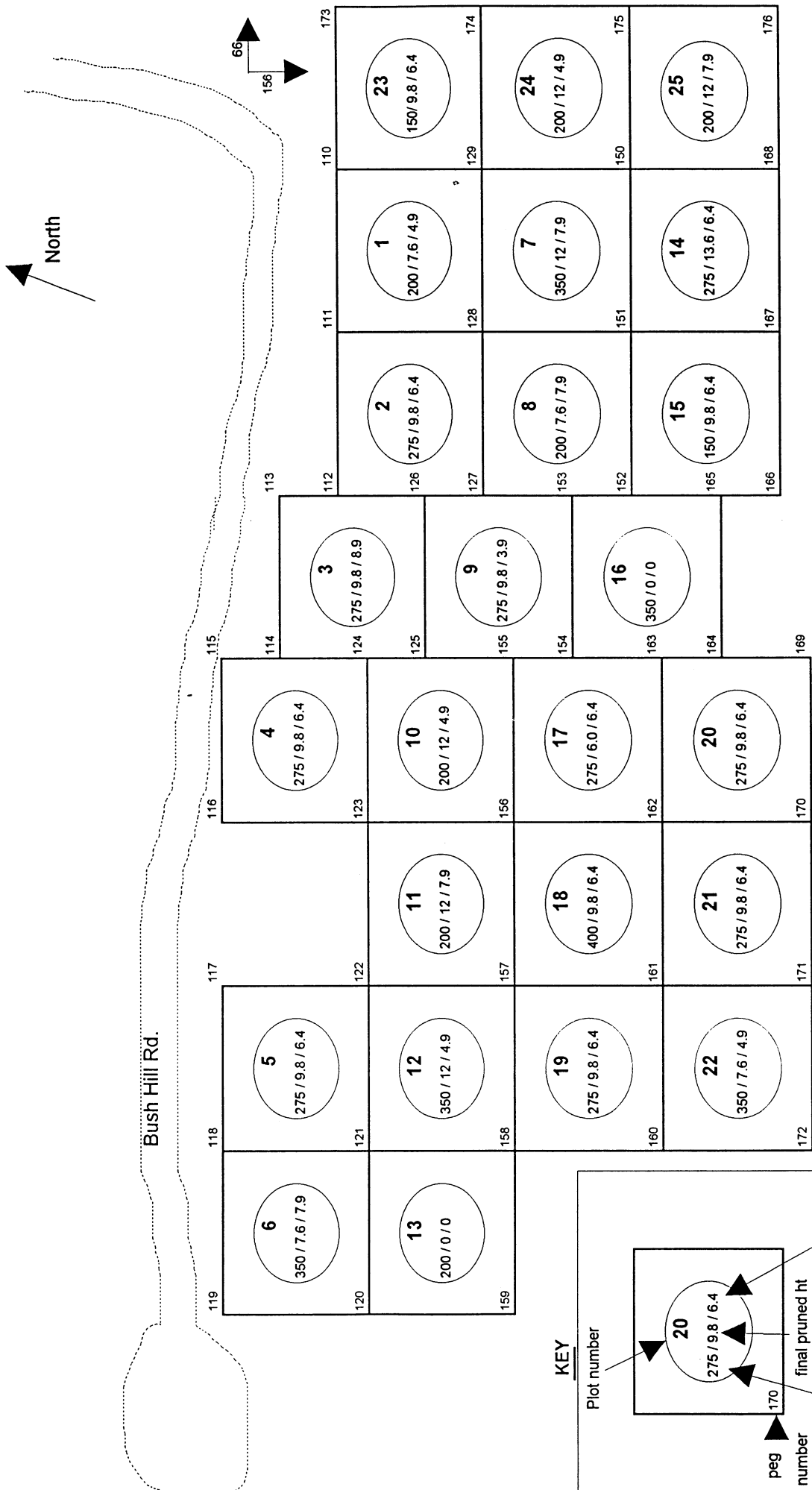
**Comments:** Stocking in this stand prior to trial installation was very high so site index estimates maybe optimistic.



**Table 4: Treatments by Blocks. at FR201 - Ngaumu**

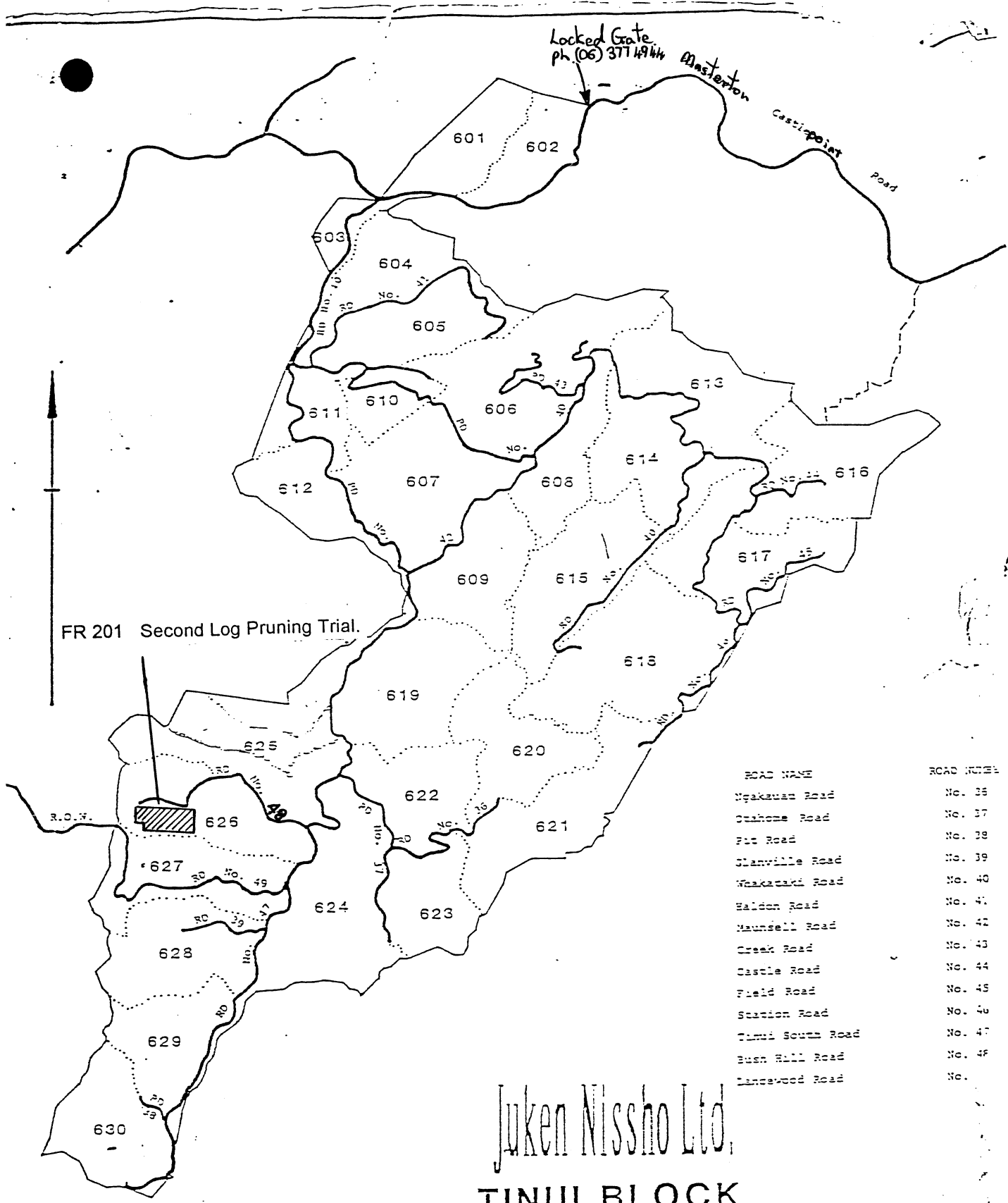
Block	Plot Number	Crown length (m)	Final stocking (stems / ha)	Final pruned height (m)	Total height at final prune (m)
One	15 / 64 / 15	6.4	150	9.8	16.2
One	15 / 64 / 23	6.4	150	9.8	16.2
One	27 / 39 / 9	3.9	275	9.8	13.7
One	27 / 64 / 17	6.4	275	6.0	12.4
One	27 / 64 / 19	6.4	275	9.8	16.2
One	27 / 64 / 2	6.4	275	9.8	16.2
One	27 / 64 / 20	6.4	275	9.8	16.2
One	27 / 64 / 21	6.4	275	9.8	16.2
One	27 / 64 / 14	6.4	275	13.6	20
One	27 / 64 / 4	6.4	275	9.8	16.2
One	27 / 64 / 5	6.4	275	9.8	16.2
One	27 / 89 / 3	8.9	275	9.8	18.7
One	40 / 64 / 18	6.4	400	9.8	16.2
One	20 / 0 / 13	unpruned	200	0	
Two	20 / 49 / 1	4.9	200	7.6	12.5
Two	20 / 49 / 10	4.9	200	12.0	16.9
Two	20 / 49 / 24	4.9	200	12.0	16.9
Two	20 / 76 / 8	7.9	200	7.6	15.5
Two	20 / 79 / 11	7.9	200	12.0	19.9
Two	20 / 79 / 25	7.9	200	12.0	19.9
Two	35 / 49 / 12	4.9	350	12.0	12.5
Two	35 / 49 / 22	4.9	350	7.6	16.9
Two	35 / 76 / 6	7.9	350	7.6	15.5
Two	35 / 76 / 7	7.9	350	12.0	19.9
Two	35 / 0 / 16	unpruned	350	0	

FR 201 - NGAUMU SECOND LOG PRUNING TRIAL



**KEY**

The diagram shows a plot with the number 20 and dimensions 275 / 9.8 / 6.4. Arrows point from the labels to the corresponding parts of the plot: 'Plot number' points to the number 20, 'final pruned ht' points to the first dimension (275), 'crown length remaining' points to the second dimension (9.8), and 'stems / ha' points to the third dimension (6.4). A 'peg number' 170 is also indicated.



Locked Gate  
ph. (06) 377 1944

Masterston

Casting Point Road

FR 201 Second Log Pruning Trial.

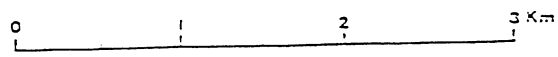
R.O.W.

ROAD NAME

ROAD NUMBER

Ngakeuan Road	No. 36
Outhome Road	No. 37
Pit Road	No. 38
Slavville Road	No. 39
Wakatu Road	No. 40
Haldon Road	No. 41
Haunsell Road	No. 42
Creek Road	No. 43
Castle Road	No. 44
Field Road	No. 45
Station Road	No. 46
Tinui South Road	No. 47
Bush Hill Road	No. 48
Lanewood Road	No.

Juken Nissho Ltd.  
**TINUI BLOCK**  
NGAUMU FOREST



## FR 241 AUPOURI - ESTABLISHMENT DATA

**Trial No.:** FR 241

**Contact Person:** Paul Tolladay  
ph (09) 406 7024

**Forest Owner:** Juken Nissho Ltd  
P.O. Box 215  
Awanui

**Forest and Compartment:** Aupouri Cpt 148 & 150

**Year stand planted:** 1987

**Stocking at installation** 1200

**MTH at installation:** 11.5

**GF Rating:**

**Treatment of surrounding Compartment:**

*P. radiata* pruned to 9 metres,  
approx 1100 stems/ha

**Latitude/Longitude:** S. Lat. 34° 45'

**E. Long.** 173° 04'

**Altitude:** 50 metres

**Geology:** Recent sand on Sandstone

**Climate:** Rainfall 1200 mm p.a., mild winters, hot dry summers, moderately windy.

**Weeds:** None.

**Slope and aspect:** 0-10° N.W.

**Date trial installed:** December 1994

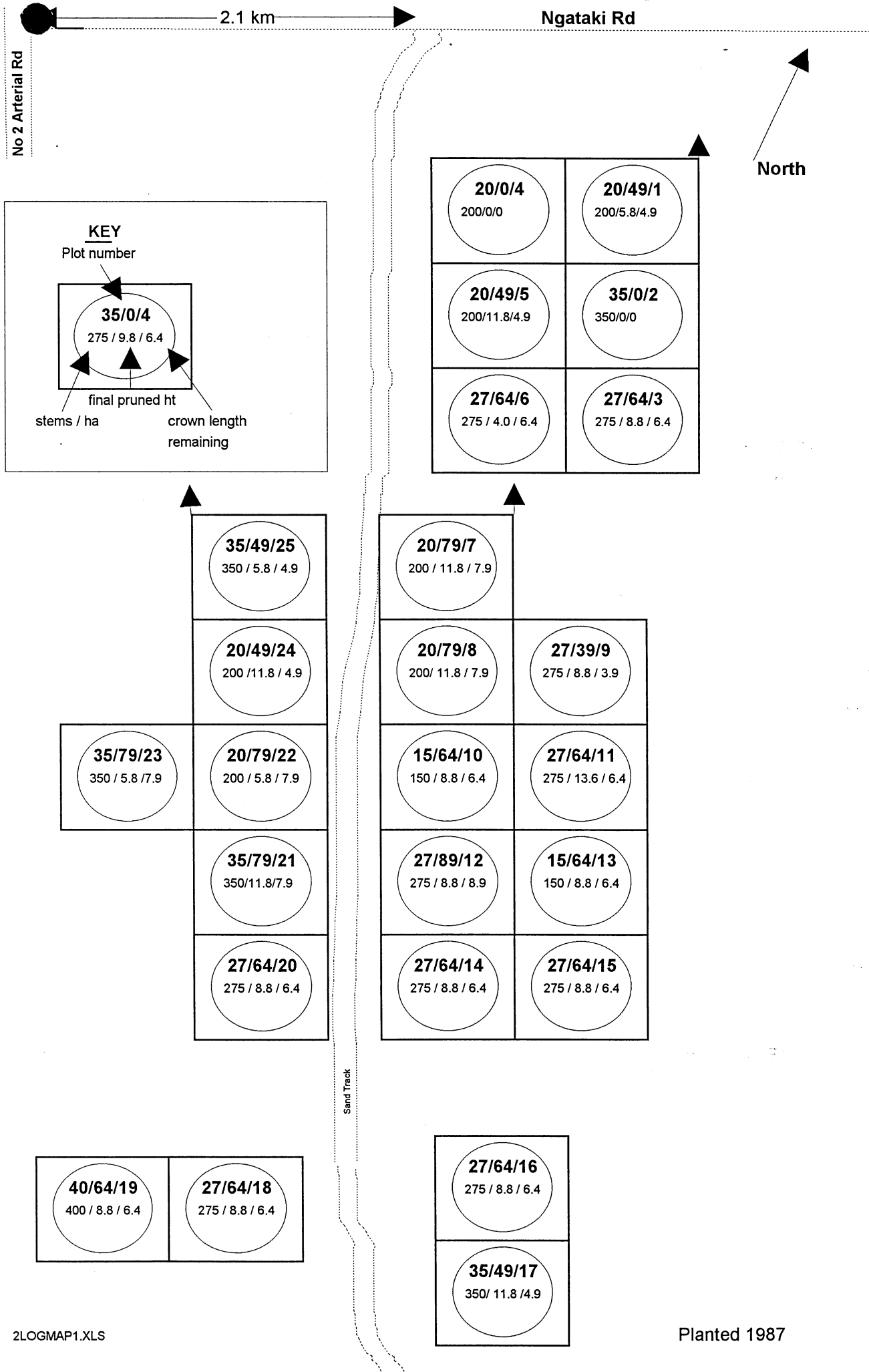
**Previous land use:** Sand Dune

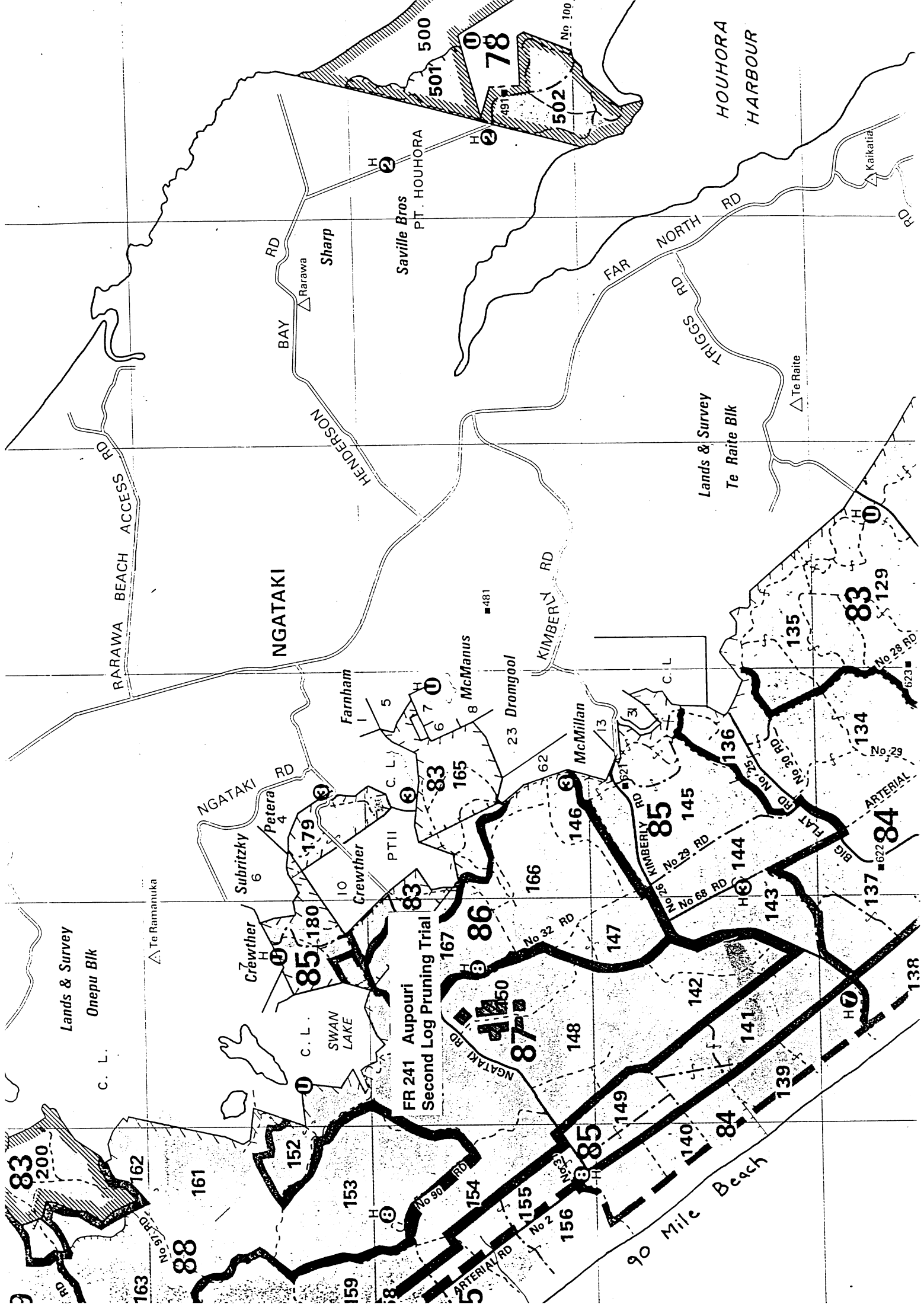
**Comments:** The initial stocking of the trial area at the time of establishment was >1200 stems /ha with approx 300 trees pruned to 4 metres.

**Table 5: Treatments by Blocks. at FR241 - Aupouri**

Block	Plot Number	Crown length (m)	Final stocking (stems / ha)	Final pruned height (m)	Total height at final prune (m)
1	15 / 64 / 10	6.4	150	8.8	16.2
1	15 / 64 / 13	6.4	150	8.8	16.2
1	27 / 39 / 9	3.9	275	8.8	13.7
1	27 / 64 / 6	6.4	275	4.0	12.4
1	27 / 64 / 3	6.4	275	8.8	16.2
2	27 / 64 / 14	6.4	275	8.8	16.2
1	27 / 64 / 15	6.4	275	8.8	16.2
1	27 / 64 / 16	6.4	275	8.8	16.2
1	27 / 64 / 11	6.4	275	13.6	20
2	27 / 64 / 18	6.4	275	8.8	16.2
2	27 / 64 / 20	6.4	275	8.8	16.2
1	27 / 89 / 12	8.9	275	8.8	18.7
1	40 / 64 / 19	6.4	400	8.8	16.2
2	20 / 0 / 4	unpruned	200	0	
2	20 / 49 / 1	4.9	200	5.8	12.5
2	20 / 49 / 5	4.9	200	11.8	16.9
2	20 / 49 / 24	4.9	200	11.8	16.9
2	20 / 79 / 22	7.9	200	5.8	15.5
2	20 / 79 / 7	7.9	200	11.8	19.9
2	20 / 79 / 8	7.9	200	11.8	19.9
2	35 / 49 / 25	4.9	350	5.8	12.5
2	35 / 49 / 17	4.9	350	11.8	16.9
2	35 / 79 / 23	7.9	350	5.8	15.5
2	35 / 79 / 21	7.9	350	11.8	19.9
2	35 / 0 / 2	unpruned	350	0	

# FR 241 Aupouri Second Log Pruning Trial





## FR 243 WAIOTAHİ - ESTABLISHMENT DATA

**Trial No.:** FR 243

**Contact Person:** Gael Johnstone  
(07) 323 4599

**Forest Owner:** Tasman Forestry Ltd  
P.O. Box 105  
KAWERAU

**Forest and Compartment:** Waiotahi Cpt 20/1

**Year stand planted:** 1988

**Stocking at installation** 647

**MTH at installation:** 13.4 metres

**GF Rating:** 17

**Treatment of surrounding Compartment:**

*P. radiata* pruned to 6.5 metres,  
approx 300 stems/ha

**Latitude/Longitude:** S. Lat. 38° 10'

**E. Long.** 177° 13'

**Altitude:** 90 metres

**Geology:** Undifferentiated alluvium

**Soil type:** Fertile light yellowish grey silt loam.

**Climate:** Rainfall 1700 mm p.a., cool winters, warm humid summers, sheltered.

**Weeds:** None.

**Slope and aspect:** 7° N.

**Date trial installed:** May 1995

**Previous land use:** pasture

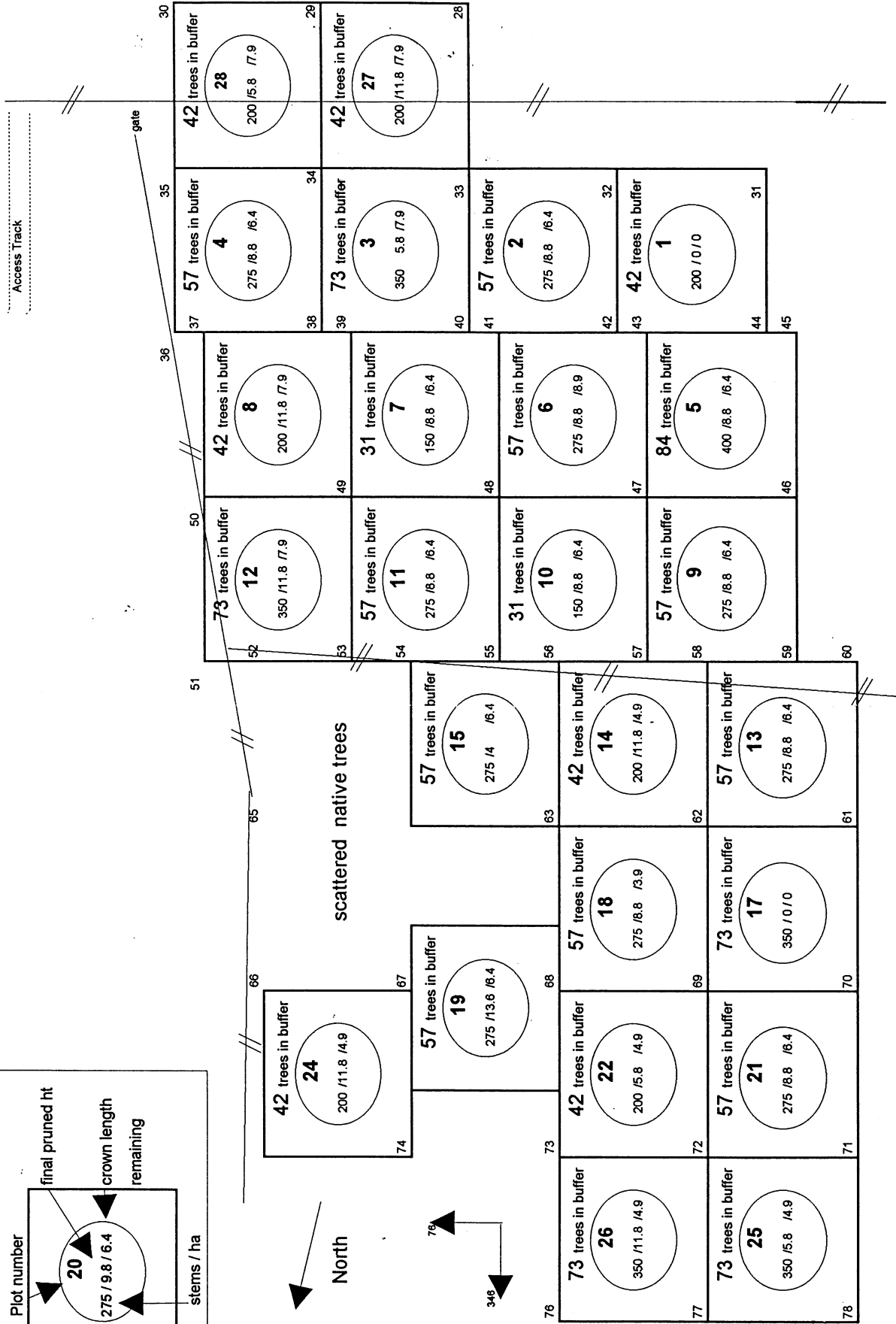
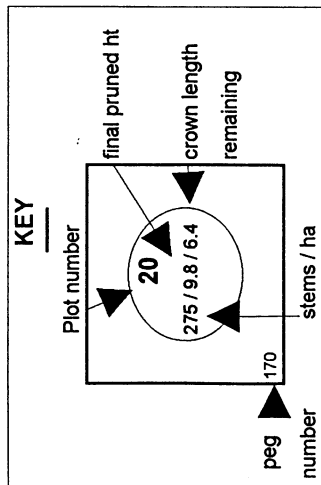
**Comments:** This site has been and still is used for dairy runoff grazing.  
It is flat with scattered mature podocarps.



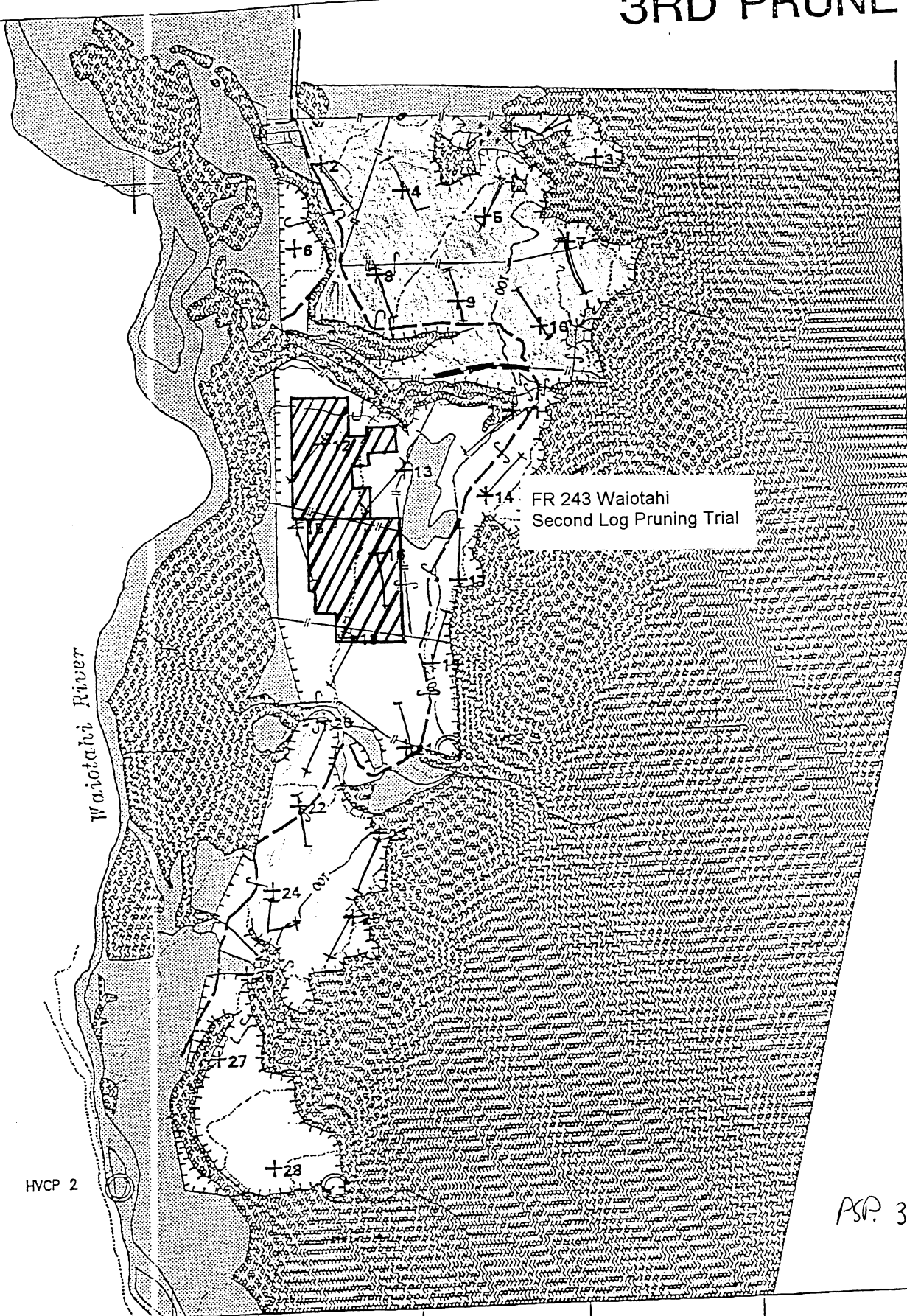
**Table 6: Treatments by Blocks. at FR243 - Waiotahi**

Block	Plot Number	Crown length (m)	Final stocking (stems / ha)	Final pruned height (m)	Total height at final prune (m)
1	15 / 64 / 7	6.4	150	8.8	16.2
1	15 / 64 / 10	6.4	150	8.8	16.2
1	27 / 39 / 18	3.9	275	8.8	13.7
1	27 / 64 / 15	6.4	275	4.0	12.4
2	27 / 64 / 2	6.4	275	8.8	16.2
2	27 / 64 / 4	6.4	275	8.8	16.2
1	27 / 64 / 9	6.4	275	8.8	16.2
1	27 / 64 / 11	6.4	275	8.8	16.2
1	27 / 64 / 19	6.4	275	13.6	20
2	27 / 64 / 13	6.4	275	8.8	16.2
1	27 / 64 / 21	6.4	275	8.8	16.2
1	27 / 89 / 6	8.9	275	8.8	18.7
1	40 / 64 / 5	6.4	400	8.8	16.2
2	20 / 0 / 1	unpruned	200	0	
2	20 / 49 / 22	4.9	200	5.8	12.5
2	20 / 49 / 14	4.9	200	11.8	16.9
2	20 / 49 / 24	4.9	200	11.8	16.9
2	20 / 79 / 28	7.9	200	5.8	15.5
2	20 / 79 / 8	7.9	200	11.8	19.9
2	20 / 79 / 27	7.9	200	11.8	19.9
2	35 / 49 / 25	4.9	350	5.8	12.5
2	35 / 49 / 26	4.9	350	11.8	16.9
2	35 / 79 / 3	7.9	350	5.8	15.5
2	35 / 79 / 12	7.9	350	11.8	19.9
2	35 / 0 / 17	unpruned	350	0	

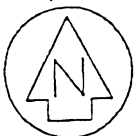

# FR 243- WAIOTAHU SECOND LOG PRUNING TRIAL

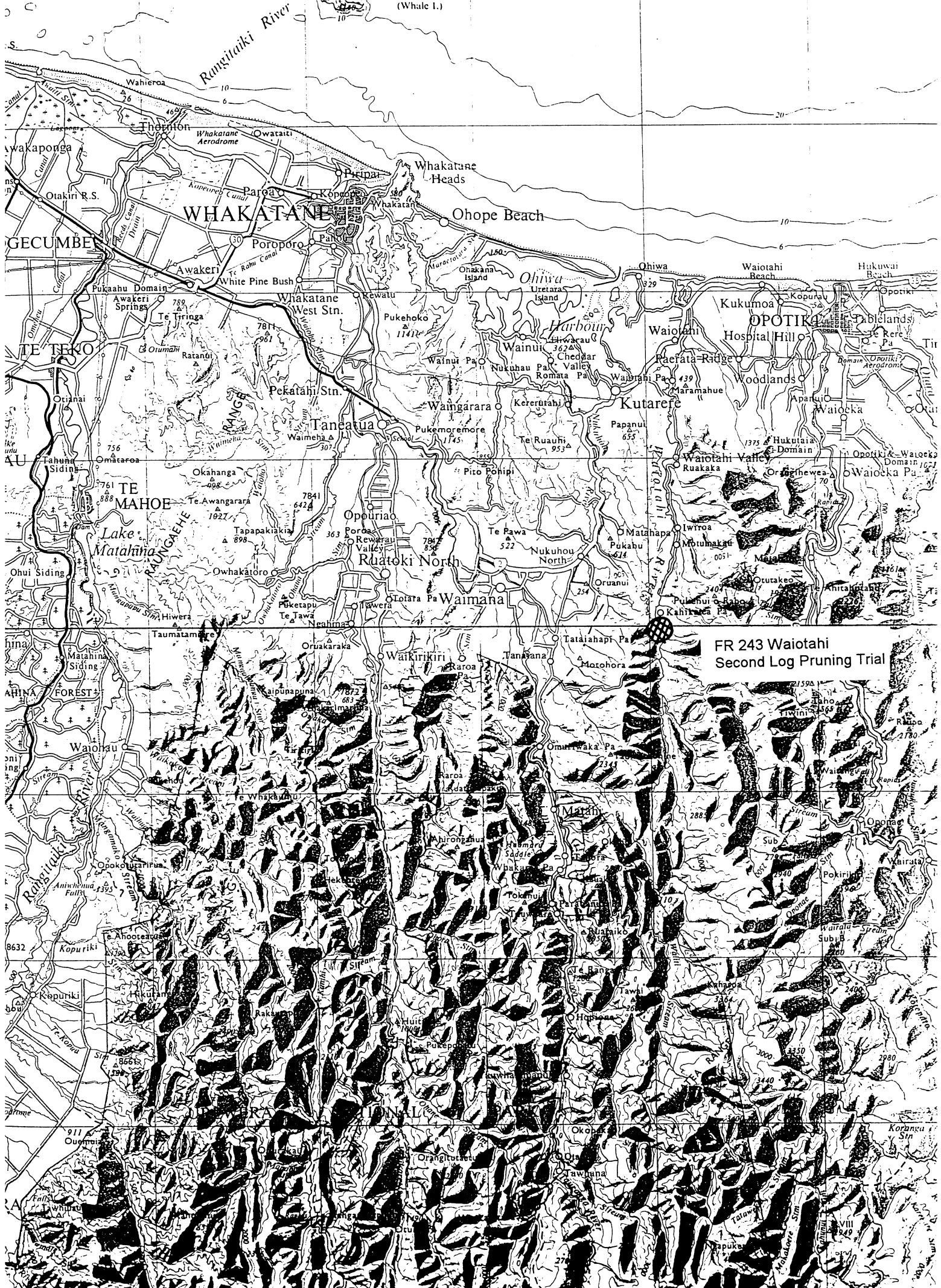


# 3RD PRUNE



PSR 32

5-OCT-1994	<p>P3</p> 	<p>1938 P.RAD 647 s/ha 0 mxdos</p>	<p>Registration x1: 2875550 y1: 6327000 x2: 2877350 y2: 6329300</p>		<p>Scale 1:10,000 C.I. 10m</p>	<p>WAIOTAH 20/1 55.6 ha (6) W16-S.2</p>
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FR 243 Waiotahi  
Second Log Pruning Trial

## FR 247 OTAGO COAST - ESTABLISHMENT DATA

**Trial No.:** FR 247

**Contact Person:** Max Smith  
ph (03) 489 3234

**Forest Owner:** Wenita Forest Products Ltd  
PO Box 341  
MOSGIEL

**Forest and Compartment:** Otago Coast (Cuttance Blk) Cpt 47

**Year stand planted:** 1986

**Stocking at installation** 1000

**MTH at installation:** 10.8 metres

**GF Rating:**

**Treatment of surrounding Compartment:**

*P. radiata* pruned to 6 metres,  
approx 300 stems/ha

**Latitude/Longitude:** S. Lat. 45° 58'

**E. Long.** 170° 11'

**Altitude:** 120 metres

**Geology:** Grey to red coarse shist breccia grading downwards  
to cobble and pebble conglomerate

**Soil type:** Yellow grey to yellow brown earth intergrade.

**Climate:** Rainfall 1200 mm p.a., cool winters, hot dry summers, very windy.

**Weeds:** Grasses with isolated gorse and shrub hardwoods.

**Slope and aspect:** 15-20° NNW.

**Date trial installed:** May 1995

**Previous land use:** Reverted pasture

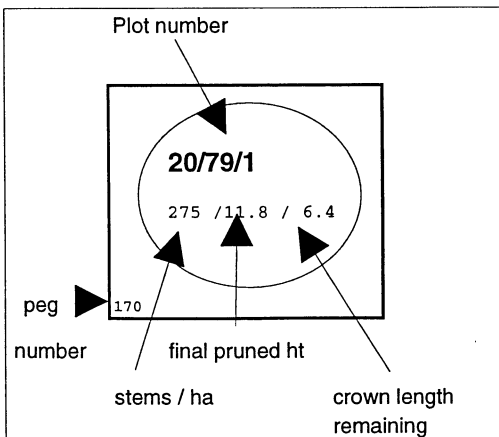
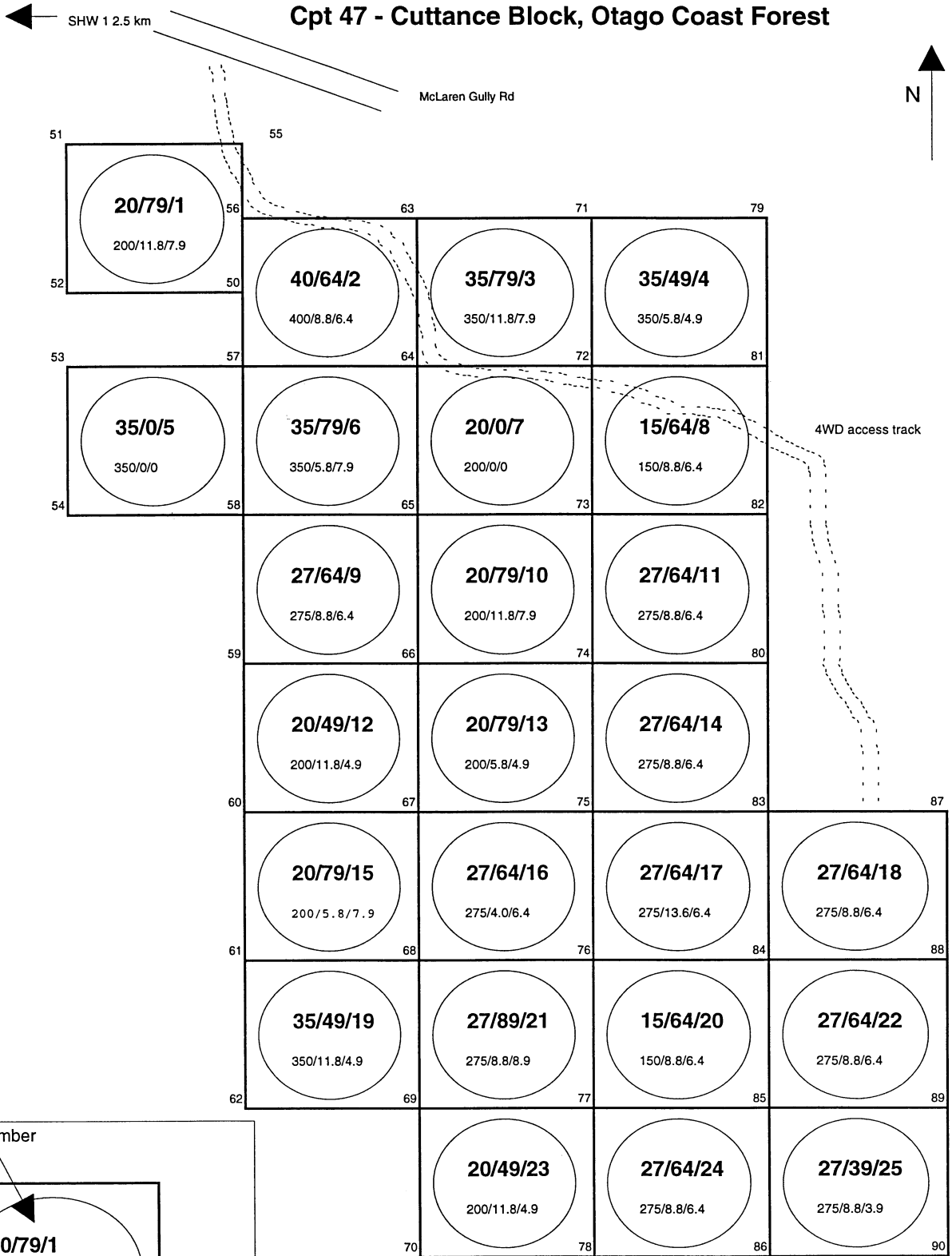
**Comments:** This site is sheltered from the north westerly and southerly winds and has  
a grass understory. Growth maybe better than many sites in the forest.

**Table 7: Treatments by Blocks. at FR247 - Otago Coast**

Block	Plot Number	Crown length (m)	Final stocking (stems / ha)	Final pruned height (m)	Total height at final prune (m)
2	15 / 64 / 8	6.4	150	8.8	16.2
2	15 / 64 / 20	6.4	150	8.8	16.2
2	27 / 39 / 25	3.9	275	8.8	13.7
2	27 / 64 / 16	6.4	275	4.0	12.4
2	27 / 64 / 9	6.4	275	8.8	16.2
2	27 / 64 / 11	6.4	275	8.8	16.2
2	27 / 64 / 14	6.4	275	8.8	16.2
2	27 / 64 / 18	6.4	275	8.8	16.2
2	27 / 64 / 17	6.4	275	13.6	20
2	27 / 64 / 22	6.4	275	8.8	16.2
2	27 / 64 / 24	6.4	275	8.8	16.2
2	27 / 89 / 21	8.9	275	8.8	18.7
2	40 / 64 / 2	6.4	400	8.8	16.2
2	20 / 0 / 7	unpruned	200	0	
1	20 / 49 / 13	4.9	200	5.8	12.5
1	20 / 49 / 12	4.9	200	11.8	16.9
1	20 / 49 / 23	4.9	200	11.8	16.9
1	20 / 79 / 15	7.9	200	5.8	15.5
1	20 / 79 / 1	7.9	200	11.8	19.9
1	20 / 79 / 10	7.9	200	11.8	19.9
1	35 / 49 / 4	4.9	350	5.8	12.5
1	35 / 49 / 19	4.9	350	11.8	16.9
1	35 / 79 / 6	7.9	350	5.8	15.5
1	35 / 79 / 3	7.9	350	11.8	19.9
1	35 / 0 / 5	unpruned	350	0	

# FR 247 - Otago Coast Second Log Pruning Trial

## Cpt 47 - Cuttance Block, Otago Coast Forest



OTAGO COAST

OTCO 047

01  
P.RAD  
1886  
50.0

46

MCLAREN GULLY RD

FR 247 Second log pruning trial  
**DO NOT PRUNE OR THIN**  
Contact NZFRI 07 3475 899 - M. Dean

047



← Mosgiel

ALLANTON

HOPE HILL  
blk.

Bruce Rocks

FR 247 Otago Coast  
Second Log Pruning Trial

OTAGO COAST FOREST  
North Blocks

SH 1

CUTTANCE  
blk.

JOHNSON  
blk.

BRUCE  
blk.

ALLANTON  
blk.

WILSON  
blk.

Henley

POPHAM

MORRISON

Tairāwhiti Mouth

## **Appendix 1 - Work Plan**

### **SECOND LOG PRUNING TRIAL**

#### **Objective:**

To monitor the effect on tree growth and DOS of pruning radiata pine above 6.0m.

#### **Introduction:**

The current high prices received for pruned log prices has resulted in an increased interest from forest managers on how to grow a greater volume of pruned logs. The traditional pruned height of approximately 6m is being questioned and final stockings revised. In the past two or three years some forest companies have already moved away from the accepted industry standard by pruning to 8 - 8.5m. This change in strategy has been largely to achieve multiples of peeler bolt lengths rather than sawlogs.

The effect on tree growth (and the resulting DOS size ) of pruning the second log (ie. above 6 metres) is currently predicted using the EARLY growth model. However the lack of data from plots ( as few as six exist at stockings in the 200-300 stems / ha range) pruned above 6 metres has meant that these predictions have never been adequately validated. Data is needed to give confidence that model predictions are accurate for the important trade off between clearwood production above 6 metres and tree growth. The data derived from these trials will initially be used to validate the existing growth models and will likely be used in the derivation of new functions in future upgrades of EARLY or other new models.

#### **LOCATION:**

It is intended that this study form a series of trials located on a range of sites.

These are; a medium fertility site with an average site index in Ngaumu forest, a high fertility high site index (>34 metres) ex farm site at Waiotahi and a Medium - low site index site at Otago Coast forest, and a low to medium site index low fertility sand site at Aupouri forest.

#### **TRIAL DESIGN:**

The data from this trial series will be used for validating and / or constructing models. Therefore a trial design suited to regression analysis techniques has been chosen in preference to designs allowing for comparison between treatments by analysis of variance. Also the trial design has been chosen to limit the number of plots involved in order that it can be easily repeated on a range of sites.

The trial design will involve a three factor fully rotatable response surface design as given in table 1. To increase the robustness of the trial design some treatments at the lower stockings will be replicated twice.

Table 1 summary of treatment levels.

Variable	step	-1.68	-1	0	1	1.68
Pruned height	3.0m	4.0	5.8	8.8	11.8	13.6
Crown length	1.5m	3.9	4.9	6.4	7.9	8.9
Final stocking	75 stems/ha	150	200	275	350	400

### TREATMENTS:

From studies involved in the development of the EARLY growth model it is now known that crown/ha is a major parameter in determining stand basal area growth. Treatments in this study will involve variations of the variables determining crown/ha ie crown length, stems/ha, and pruned height. In addition to the pruning treatments an unpruned control will be included at 150 and 350 stems / ha final stocking. Table 2 gives the combinations of variables and number of plots.

Table 2. Numbers of plots as indicated by pruned height

			Final	stocking		
		150	200	275	350	400
	3.9			8.8*		
Crown	4.9		5.8, 11.8 x2		5.8,11.8	
length (m)	6.4	8.8 x2		4.0, 8.8x6, 13.6		8.8
	7.9		5.8 , 11.8 x2		5.8,11.8	
	8.9			8.8		
	unpruned		0.0		0.0	

\* pruned height (m)

Total number of plots = 25

Additional plots may be added to include the effect of followers or to include local treatment variations. Some plots at the lower stockings are replicated to provide added robustness to the trial design.

### METHOD:

The trial will be installed into a pruned stand with a stocking of at least 400 acceptable stems / ha prior to the high pruning being carried out ie.( $<11.0$  m MTH). A uniform site 7.8 hectares in area is required to install the trial.

Pruning treatments will be applied when due according to the plot treatment allocated.

#### Plot layout

Each treatment plot will consist of a 0.309 ha square ( $55.6 \text{ m} * 55.6 \text{ m}$ ) plot within which a 0.1000 ha circular plot containing the trees to be measured will be established. The plot radius for the circular plot is 17.8 metres plus slope correction where required. This plot layout allows for a buffer of 10 metres.

All trees will have a numbered tag attached 5 cm above the measurement point for DBH. Tags will be located so that the DBH measurement can be taken free of nodal swelling, but as close as possible to 1.4 metres above ground level on the uphill side of the tree. All tags should face the plot centre peg.

Before treatments are allocated a sample of 27 pruned crop trees from each plot will be measured for DBH and height. This will allow plots to be blocked using basal area and or height to stratify plots into two groups:

Treatments will be allocated randomly to each block. Blocking of treatments is as listed in Table 3

1 metre tall 50\*50 mm square treated pegs will be used to mark the corners of treatment boundaries and 1.8 metre tall deer battens will mark plot centres. All pegs will be painted with yellow paint and labelled with FRI "Do not prune or thin" tags.

**.Table 3: Treatments by Blocks.**

Block	Plot Number	Crown length (m)	Final stocking (stems / ha)	Final pruned height (m)	Total height at final prune (m)
Block One		6.4	150	8.8	16.2
		6.4	150	8.8	16.2
		3.9	275	8.8	13.7
		6.4	275	4.0	12.4
		6.4	275	8.8	16.2
		6.4	275	8.8	16.2
		6.4	275	8.8	16.2
		6.4	275	8.8	16.2
		6.4	275	13.6	20
		6.4	275	8.8	16.2
		6.4	275	8.8	16.2
		8.9	275	8.8	18.7
		6.4	400	8.8	16.2
		unpruned	200	0	
Block 2		4.9	200	5.8	12.5
		4.9	200	11.8	16.9
		4.9	200	11.8	16.9
		7.9	200	5.8	15.5
		7.9	200	11.8	19.9
		7.9	200	11.8	19.9
		4.9	350	5.8	12.5
		4.9	350	11.8	16.9
		7.9	350	5.8	15.5
		7.9	350	11.8	19.9
		unpruned	350	0	

**PRUNING AND THINNING:**

At the time of trial installation all plots will be pruned according to their allocated treatment, ie to leave a prescribed crown length and stocking. Thereafter plots will be pruned as scheduled by FRI. Pruning lifts will be scheduled to remove approximately two metres of crown per visit to the tree. The costs of each lift will be kept by the forest. FRI staff will either mark the stem, of all trees to be pruned, with spray paint at the top of the pruning lift or intensively supervise the pruners at the time of pruning using a suitable height pole. The trial is to be thinned to designated final crop stockings immediately following the initial pruning treatment (i.e. 11.0 m )

**MEASUREMENTS:**

All plots will be measured annually, in winter, for DBH, height and green crown height according to FRI standard measurement procedures. When a pruning operation has been carried out all trees in the plot will be measured for DBH, height ,pruned height, DOS, DOS height, and Maximum branch. All data will be entered in the NZ FRI PSP system.

Dothistroma will be assessed annually in each plot.

**DURATION OF THE TRIALS:**

It is intended that this trial series yield valuable data on tree growth and log quality as affected by the treatments applied, therefore it is envisaged that intensive measurements will continue until all silviculture has been completed. From then until harvest plots will be measured, in winter, on a less intensive 2-3 year cycle.

**RESPONSIBILITIES:****FOREST:**

- Provide a suitable site and ensure adequate security procedures are put in place and maintained to protect the trial area from other forest operations.

Carry out pruning and thinning treatments as required in plots.

Maintain a record of pruning cost for the trial.

Assist with plot installation if required.

**FRI:**

Layout trial and allocate treatments.

Supervise the installation of pruning and thinning treatments.

Maintain and remeasure measurement plots.

Summarise and report data regularly.

Liaise with appropriate staff to have plots assessed for Dothistroma annually.